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ABSTRACT

A study was conducted to determine the efficacy of two prewriting strategies--outlines and rough, rather than polished, first drafts--in lessening the writer's workload. Eighteen college students were assigned a persuasive business letter writing task in control, outline, rough first draft, and polished first draft conditions. The letters were judged on language usage, coherency, idea development, effectiveness, and mechanics. Any benefits from the outlines and rough drafts presumably would be evident in the letters. Subjects were also trained in directed introspection, in which they identified their thoughts during writing as best fitting one of four categories: planning, translating, reviewing, or other. The results of the letter writing task analysis and the introspection training indicated that use of written outlines increased the time spent translating ideas into text and improved the quality of letter, but failed to effect overall writing efficiency. The use of rough versus polished drafts affected when the students revised their work, but had no effect on quality or efficiency. A subsequent survey of science and engineering faculty supported these laboratory results. Academic writers who reported frequent use of outlines during prewriting also tended to use polished drafts. However, their use of a polished draft strategy had no consequences for their productivity. (Author/HTH)

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Cognitive Strategies in Writing

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Working Paper No. 2
Based on a presentation at the annual meeting of the Psychonomic Society, November 1984

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Abstract

Preparing a written outline during prewriting and composing a rough rather than a polished first draft are cognitive strategies that presumably lessen a writer's workload. The present research examined whether these strategies enhance writing performance. In an experiment I manipulated the use of these strategies by college students in a letter writing task. The student's writing process, efficiency, and quality were dependent variables. The results showed that using written outlines increased the time spent translating ideas into text and improved the quality of letters compared with not using them, but failed to affect overall writing efficiency. The use of rough versus polished drafts affected when the students reviewed their work as expected, but had no influence on quality or efficiency. In a survey of science and engineering faculty, I examined the use of written outlines and polished first drafts, and explored the consequences of their use for productivity. The findings of this field investigation paralleled the laboratory results. The reported frequency of using written outlines correlated positively with the reported number of documents produced in a three year period; no relationship emerged for the use of polished first drafts.

Cognitive Strategies in Writing

The time and effort required by writing makes it a cognitively and emotionally exhausting task. Documents vary in the demands that they place on the writer, of course, but only the briefest and most routine items emerge quickly and effortlessly. A writer is not likely to react to these demands in a detached fashion as is illustrated by the following quotation attributed to the novelist James Jones: "I hate writing. I love having written". Lowenthal and Wason (1977) asked academic writers how they felt about the job and most reported this type of mixed but intense response (e.g., "writing is a very hard grind--the good times come along only on the back of sweat and tears"). A few found nothing good about the experience (e.g., writing is like "being sick"), and a few took great pleasure in it (e.g., writing is as enjoyable as "making love").

In this paper, I examine two cognitive strategies that presumably lessen the writer's workload and conceivably help the writer to maintain his or her composure. Writing experts often recommend organizing one's ideas into a written outline during prewriting and composing a rough draft in which revision is delayed during the early phases of composition. Do these strategies work? I make two main points here, one empirical and one methodological. My results suggest that the outline strategy alone benefits the quality of the resulting document, and neither strategy improves the writer's overall efficiency. As for the methodological point, conclusions about writing and other

complex, real world cognitive skills should be based on both laboratory and field research. Well-controlled laboratory experiments are necessary, of course, for establishing causal relations among variables. Surveys or other field investigations of how writing is done outside the laboratory are just as necessary for establishing the generality of such relations.

Theoretical and Empirical Background

The availability of cognitive effort and the capacity of working memory are widely viewed as important limitations on human information processing. Writing theorists reasonably invoke these limitations to explain in part why writing is so difficult (de Beaugrande, 1984; Daiute, 1983; Flower & Hayes, 1980, Nold, 1981). Writing involves several processes that occur recursively throughout prewriting, first draft, and subsequent draft stages of document preparation. Collecting information (reading, listening, searching bibliographic sources), planning text (creating ideas, organizing ideas, and setting goals), translating plans into text (creating acceptable sentences--actual language production), and reviewing text (reading, evaluating, and editing errors) all demand cognitive effort and space in working memory. If insufficient cognitive effort is allocated to a process, then less than optimal performance is the likely result. If mental representations are not given enough space in working memory, then forgetting is the likely result.

Less than optimal processing performance and forgetting should reasonably affect measures of writing efficiency and quality. Efficiency refers to the amount of time taken to produce a finished document of a certain length. Words composed

per minute (WPM) is a convenient measure of this. The time spent on a document can be difficult to determine in real world writing, but in the laboratory WPM can be easily calculated. Quality is more difficult to measure both in and out of the laboratory. Quality refers here to a collection of measures concerning how well a document communicates or achieves its purpose with its intended audience. Bruce, Collins, Rubin, and Gentner (1982) described a document of high quality as one that is comprehensible, enticing, persuasive, and memorable. Implicit in this description is the belief that quality cannot be defined in terms of text characteristics alone. The knowledge and attitudes that the reader brings to the text are also important. If so, then it is necessary to measure quality through judgments by readers, and it is reasonable to expect readers to disagree. Here I asked two readers to judge documents on various scales (e.g., coherency) and examined the extent to which they agreed. A thorough discussion of the advantages and problems of reader judgments of quality is beyond the scope of this paper. Useful references on this topic are articles by Hirsch and Harrington (1981) and by Cherney (1984).

Strategies that reduce the writer's workload may pay off in high ratings of quality and high WPM. Organizing ideas into a written outline during prewriting could reduce workload during composition in two ways. First, it may decrease the need for planning while writing a draft, allowing the writer to focus time and effort on translating and reviewing. Secondly, it may provide an external memory for guiding the writer through the

draft. Composing a rough draft, in which reviewing is delayed initially, may allow more cognitive effort to be devoted to planning and translating during the early phases of composition. This contrasts with composing a polished draft, in which planning, translating, and reviewing all compete for resources throughout composition.

What evidence is there that outlines and rough drafts improve either the quality or efficiency of writing? Writing authorities recommend the outline (Ewing, 1974) and rough draft (Elbow, 1981) strategies. Yet, clear empirical support for their use is hard to find. First, in a series of interviews with well-known and prolific fiction writers, one finds examples of all possible combinations of these two strategies (Cowley, 1957). Such writers do not necessarily outline or compose rough drafts. Second, Lowenthal and Wason (1977) surveyed university faculty and found that authors who plan extensively during prewriting, as required by outlining, detest writing. Whether this dislike meant for lower productivity is unclear, however, as it was not measured. Third, Gould, Conti, and Hovanyecz (1983) found that a rough draft strategy was more efficient than a polished draft strategy (10.6 versus 8.0 words composed per minute). Still, the documents were judged to communicate most effectively when a polished draft strategy was used to compose them. In contrast, Glynn, Britton, Muth, and Dogan (1982), using different procedures from Gould et al. (1983), reported clear disadvantages for the polished draft strategy in terms of the number of effective arguments included in the text, a measure of quality.

In addition to these inconsistencies, apparently no experiment has examined both strategies simultaneously.

Experimental Rationale and Method

Design and Measurements

This experiment examined the use of no outlines versus outlines and rough draft versus polished draft strategies in a between subjects design. The purpose was to determine if outlines and draft strategies actually influence the efficiency and quality of writing. Eighteen college students were assigned randomly to each of the four conditions. They wrote a persuasive business letter in a task developed by Atlas (1977) as a standardized writing test for college students. In this task, subjects learned numerous facts about a controversy regarding busing systems for the handicapped, organized and integrated these facts, and wrote a letter arguing in favor of a particular system. The rationale behind this task was that subjects did not have a clear plan for writing their letters and the task called for a fairly complex and demanding letter. If outlines and rough drafts help, then they should show benefits in this task.

Both the product and the process of writing were of interest in this experiment. Two judges rated the product on five indices of quality using seven point scales. They judged language usage, coherency, idea development, effectiveness, and mechanics. I derived an overall measure of letter quality by summing the average rating given by the judges across all five indices. In addition, I tallied the number of words produced in the finished letter, the number of words crossed out in the letter, and the number of words inserted in the letter.

To measure the process I noted the time required to produce the letter, allowing a calculation of WPM, and used a method of directed introspection (Ericsson & Simon, 1978). The experimenter trained the subjects to identify their thoughts during writing as best fitting one of four categories: planning, translating, reviewing, or other. The training involved (a) instructions that define and give examples of the processes, (b) sample situations where a fictitious businessman thinks aloud while writing letters and his thoughts (in written form) are categorized by the experimenter as planning, translating, reviewing, or other, and (c) a test situation where the subject makes such categorizations and is provided feedback from the experimenter. The experimenter asked the subjects to introspect once every minute during the writing task itself.

The trained introspection method employed has some advantages over the two methods typically used in writing process research: thinking aloud and pause analysis. First, consider the thinking aloud form of introspection. Thinking aloud is undirected and ideal for revealing the detailed content of thought processes invoked in writing (Ericsson & Simon, 1978). Hayes and Flower (1980) employed thinking aloud to identify the categories of planning, translating, and reviewing. Though thinking aloud is a useful technique, the collection and analysis of verbal protocols is too tedious for many subjects to be tested. The method is impractical for use in experimental designs that test as many subjects as were tested here. Moreover, thinking aloud adds an additional demand over though

the subjects are already heavily burdened by the task of writing. I worry that thinking aloud is too intrusive for many writers. Trained introspection, on the other hand, is directed--the subjects learn to categorize their thoughts as examples of planning, translating, reviewing, or other, unrelated processes. The responses are easier to analyze and are presumably easier for the subject to provide relative to thinking aloud protocols.

Second, consider pause analysis. Analysis of the pauses between hand movements while writing longhand affords some interesting conclusions about composing (Matsuhashi, 1982). However, videotaping overt behavior is relatively uninformative about what the subjects are actually doing during a pause. The subjects might be generating ideas (planning), thinking about the words to use in expressing their idea prior to actually moving their pens (translating), or reading over and editing a paragraph (reviewing). Because authors can spend over 70% of their writing time pausing (Matsuhashi and Cooper, 1978), it is important to ask subjects to introspect. Also, analysis of videotapes for pauses is as tedious as the analysis of verbal protocols; results are consequently based on only a few subjects.

Trained introspection is certainly unlikely to be a panacea for problems in tracking mental processes. Instead it could prove to be a useful complement to the think aloud and pause analysis methods of writing research. Of course, if trained introspection interferes with writing or if the responses are invalid, then the technique is of questionable value. To examine the interference question, I compared in a preliminary experiment the performance of a group of subjects who reported

while writing using trained introspection and a control group who simply wrote uninterrupted. To insure adequate statistical power for the comparison, I tested 30 subjects in each condition and found no significant differences in WPM or in judgments of quality. In fact, the means on all measures of efficiency and quality were practically identical.

Examining the validity question was more difficult because a perfectly accurate record of what a person thinks about while writing is impossible to obtain. If it were possible to obtain, then the subject's introspection responses could be matched against how the experimenter would categorize this record. Agreement in these categorizations would indicate that the subject used the terms planning, translating, reviewing, and other in a valid manner. The closest I could come to this ideal validation procedure was to obtain a verbal protocol obtained with think aloud instructions as the best available record of what the subject was thinking. This was less than ideal because the subject probably stated less information than he or she was thinking, making it harder for the experimenter to categorize appropriately.

I asked twelve subjects to think aloud at one minute intervals while writing--they spoke into a tape recorder whatever they were thinking about at the moment. The experimenter immediately categorized whether the subject's reported thoughts best represented planning, translating, reviewing, or other, and recorded a confidence rating in the accuracy of this categorization on a 3 point scale (1 = not sure, 3 = very sure).

After the writing was finished, the experimenter taught the method of trained introspection (this took 10-15 minutes) to the subject and then played the recording of the verbal protocol. The subject tried to categorize the reported thoughts just as experimenter had earlier. I waited until after the verbal protocol was obtained before training the subjects so as not to bias what they said while thinking aloud. This delay, however, probably made it harder for the subject to remember the context of his or her statements.

If the subject and the experimenter usually agreed in their categorizations, then the method of trained introspection probably yielded valid insights into the subject's actual writing processes. On average 73% of the subjects categorizations matched the experimenter's categorizations. This level of agreement is substantial when one consider (a) the memory loss that probably occurred during the 10-15 minutes between when the subject finished the writing task and when he or she started listening to the verbal protocol, and (b) the difficulties the experimenter had in categorizing some of the fragmentary statements made in the verbal protocols. Relevant to this second point, I found significantly higher confidence ratings given by the experimenter for cases where the subject agreed with the experimenter ($\bar{X}$=2.35) than when the disagreed ($\bar{X}$=1.66). This finding suggests that the cases of disagreement may well have reflected the experimenter's uncertainty about how to assign categories to another person's verbal protocol. To summarize, the subject's reported categories using trained introspections

appear to be reasonably valid reflections of his or her actual thought processes.

Procedure

The procedure involved the following steps. First, the experimenter trained the subjects in the method of directed introspection. Second, the participants studied the materials on the busing systems for the handicapped. These included background information on the pros and cons of installing special equipment on public buses versus deploying minibuses used solely by handicapped individuals. Also included was a letter advocating the public transportation approach. The subjects' task was to respond to this letter by arguing in favor of the minibus system. The experimenter presented the task as one of role playing. The subject adopted the role of the president of a company in charge of designing the transportation system to be used. The background information came from a transcribed conversation with one of the president's employees. The letter calling for a response came from the chairman of a group that lobbies for the interests of handicapped people, a group that opposes the minibus approach. A quiz on the information insured that all participants understood their task equally well. The experimenter corrected subjects on the few occasions when they made mistakes on this quiz. (A copy of the materials used in the experiment can be obtained from the author.)

Third, the experimenter read instructions appropriate to each condition. For the rough draft conditions, the instructions directed the subjects to compose a draft freely at first with the chief aim of getting their thoughts on paper rather than worrying

about how well the thoughts were expressed-then after this initial effort, to focus on the manner of expression. In contrast, the polished draft instructions directed the subjects to compose a polished draft with the chief aim of expressing their thoughts as well as possible on the first draft. The experimenter instructed all subjects to work on their letters until they were satisfied with the quality of them. There was no time limit. Those in the no outline conditions started their letter immediately after receiving their instructions, whereas those in the outline conditions worked on an outline for five to ten minutes before beginning their letters. The outline subjects filled in a page containing roman numerals (I, II, and III) and capital letters (A, B, and C). This standardized the format of the outlines; the degree of detail given on each point and the number of points included in the outline varied somewhat across participants. The experimenter recorded the time spent by each subject on the outline and on the letter. The subjects wrote in pen so that all added and deleted words could be detected.

Experimental Results and Discussion

Introspection

I examined changes in the time spent planning, translating, and reviewing while writing the letter. I divided the total time spent on the letter into thirds and then calculated for each third the percentage of times that the subject reported planning, translating, and reviewing. The percentages do not add to 100 because of the few times that the subjects reported the other

category. Figure 1 presents these data for the rough and polished draft conditions.

Insert Figure 1 About Here

The chief difference between these conditions in the time spent planning, translating, and reviewing occurs during the first third of writing. Subjects in the rough conditions focused on planning and translating, while those in the polished draft conditions reported reviewing as well as planning and translating. The central point to gain from Figure 1 is that the instructions to use a rough versus polished draft affected the subjects in the expected manner during the first third of writing.

The outline manipulation strongly affected the processes reported by the subject (Figure 2). Those in the outline conditions spent most of their time translating. In contrast, the subjects in the no outline conditions planned more, particularly during the first phase; they also reviewed more than those who outlined during all but the first phase. The central point of Figure 2 is that constructing an outline during prewriting led to more translating.

Insert Figure 2 about here

An analysis of variance on the percent-of-letter-time data indicated that the phase x process x draft condition interaction was significant, $F(4,272) = 5.35$, $p < .001$. Also significant was a main effect of process, $F(2,136)=24.78$, $p<.001$, and an

interaction of phase x process, $F(2,136)=29.15$, $p<.001$. The only other significant effect in this analysis was the .pa interaction of phase x process x outline condition, $F(4,272)=3.56$, $p<.01$.

Efficiency

To determine the efficiency of writing, I examined the total number of words written, the amount of time spent on the letter, and WPM. Only one significant effect emerged from the analyses of variance on these three variables; Table 1 presents the means on these and other measures of writing performance. The number of words written is the count of the final letter, including words added and excluding words deleted during revision. The subjects who outlined wrote an average of 139 words more than those who did not outline, $F(1,68) = 31.46$, $p < .001$. The mean time spent on the letter was also greater, by over 7 minutes, for the subjects who outlined, $F(1,68) = 7.58$, $p < .01$. Finally, WPM (based on letter time only) indicated that the subjects who outlined ($M=11.26$) wrote faster than those who did not ($M=8.47$), $F(1.68) = 10.35$, $p < .01$.

Insert Table 1 about here

Before concluding that outlining improved the efficiency of writing, it must be remembered that subjects spent more than 8 minutes of prewriting time preparing their outlines. Rough ($M=8.69$ minutes) and polished ($M=8.49$) draft instructions did not affect how much time was spent on this. If this prewriting time is added to letter time, WPM (overall) looks different, as shown in Table 1. All four conditions were statistically equivalent. Thus, outlining apparently helps the writer to compose faster but

overall efficiency is not improved because of the time required to produce the outline.

Quality

I calculated an interjudge reliability coefficient for each quality scale and for the overall sum of the five scales. The values of Pearson's r were as follows: language usage (.56), coherency (.63), idea development (.43), effectiveness (.54), mechanics (.54), and overall quality (.65). All correlations were significant ($p < .001$) but moderate in size. This degree of agreement between judges of document quality is typical of that reported in the literature (e.g., Woodruff, Bereiter, & Scardamalia, 1981-82).

Figure 3 presents the overall quality measure. Once again, an analysis of variance revealed only a main effect of outline condition, $F(1,68) = 4.21$, $p < .05$. The advantage in overall quality for the subjects who outlined was mirrored on all five scales (Table 2). However, the difference was significant only on ratings of idea development, $F(1,68) = 8.12$, $p < .01$, and effectiveness, $F(1,68) = 6.85$, $p < .05$. It was marginally significant for language usage, $F(1,68) = 2.85$, $p < .10$. All other effects, including the main effect of draft condition and interaction of draft condition x outline condition on all five scales, were nonsignificant. Although the advantage for outlining appeared to be slightly less for the polished draft condition in terms of overall quality (Figure 3), the interaction was unreliable ($p < .70$).

Insert Table 2 about here

Insert Figure 3 about here

As an indirect index of quality, I examined the revisions made on each letter by counting the number of words crossed out and the number inserted by the subject (see Table 1). One could reasonably expect that the best letters had undergone the most extensive revision. However, there were large individual differences for both measures and no significant differences among conditions in the number of words added. The only significant effect in the analysis of variance for deletions was a main effect of outline condition, $F(1,68) = 9.70$, $p < .01$. Consistent with the other measures of quality, the subjects who outlined deleted more words (M=(19.36) in revising their letters than did those who did not outline (M=8.75).

Discussion

Writers who prepared an outline during prewriting performed differently than those who began to compose without outlining. The differences occurred regardless of whether a rough or polished draft strategy was employed during composition. The subjects who outlined produced the longest letters, spent the most time writing, deleted the most words while revising, and ended up with letters judged to be the most effective and best developed. Although outlining permitted a faster composition rate, overall efficiency of writing was not enhanced when I took into account the prewriting time required for the outline. These

results indicate, then, that outlines improve certain aspects of the quality of writing but not the efficiency of writing.

Rough and polished draft conditions differed in how they composed. Those in the rough conditions reported progressively more reviewing across the first (M=.02), second (M=.20), and third (M=.38) phases. The subjects in the polished conditions reported reviewing the same proportion of times during the first and second phases (M=.22) and this proportion increased somewhat during the third phase (M=.35). These processing differences had no implications for the efficiency or the quality of writing, however. It should be noted that rough and polished draft conditions did not differ in the time spent reviewing, translating, or planning when collapsed across phase.

The outline manipulation did affect the amount of time spent on each of the three processes. Those who outlined spent the most time translating (Figure 2). Compared with the subjects in the no outline conditions, these subjects reported little planning or reviewing during composition. Thus, it appears that by planning during prewriting and putting the plan into a written outline writers not only need to plan less during composition, but they also need to review less.

A limitation of the experimental method in studying complex cognitive tasks such as writing is the question of realism. Is the task studied here representative of adult writing in college and in office work? Laboratory experiments are necessary to allow the drawing of causal conclusions. By necessity, however, such experiments are artificial--they do not match the task environment of workaday writing. Writers outside of the

laboratory face deadlines, competing demands on their time, assignments that may run dozens of pages in length and require days, months, or even years to prepare, to name just a few real world constraints. Would the conclusion that outlines but not rough drafts improve quality still hold if the evidence were based on real world writing?

Survey Rationale and Method

I surveyed science and engineering faculty at the University of Missouri concerning their writing methods and writing productivity. A total of 415 individuals were sent questionnaires and 121 responded. The 29% rate of return was low but comparable to the 17% rate reported by Lowenthal and Wason (1977) in their survey of academic writers. The range and variance of responses on all questions gave no indication that the sample was limited to people who wrote using a common method or to people with high productivity. The average respondent had held his or her Ph.D. degree for 14.73 years; the range was from 3 to 47 years. The survey included questions on work scheduling, tools, rituals, and cognitive strategies. The respondents rated how often they employed a particular method on a scale ranging from 1 (never) to 7 (always). Also, they reported the number of journal articles, technical reports, technical books, and grant related documents that they had written during the past three years. Overall productivity equalled the sum of these four numbers. A complete report of the survey is available from the author (Kellogg, 1984).

The questions on cognitive strategies included the following items of interest here. First, the respondents rated how often they prepared a written outline before beginning a document. Second, they rated how often they tried to write a polished first draft as opposed to a rough draft. The rationale was to see if use of these strategies correlated with overall productivity. Many factors undoubtedly influence productivity. Presumably one of these factors is the quality of writing, given the need for documents to pass editorial and peer review. Thus, I expected on the basis of the laboratory findings a correlation between productivity and reported use of an outline strategy.

Before presenting the results, a clarification may be in order. The respondents who reported frequently trying to compose a polished draft may not have gone through as many versions of a document before its completion compared with rough draft writers. But it would be incorrect to assume that polished draft writers successfully completed long documents on the first draft. Revising as one works through a first draft does not necessarily mean that subsequent drafts and more revising are excluded. Recall that in the letter experiment the total time reportedly spent on revision, summed across all phases of writing, was equivalent for the polished and rough draft conditions. It was the distribution across phases that differed. The survey did not attempt to measure how much time was spent revising across prewriting, first draft, and subsequent draft phases of writing.

Survey Results

The mean responses were as follows: outline (3.58), polished draft (2.49), and overall productivity (16.31). On

average, the faculty reported using outlines more often than using a polished draft strategy. The values of Pearson's r for these variables are shown in Table 2. The sample size here is 116 because of missing observations on one or more of the relevant variables for five subjects. The correlation between using outlines and productivity was significant; the draft strategy correlation was equivalent to zero. Interestingly, the correlation between outlines and polished draft strategies was significant. Writers who outline often were more likely to adopt a polished draft approach.

I divided the respondents into the following four groups on the basis of their response to the outline and polished draft questions: no outline-rough (n = 37), outline-rough (n = 21), no outline-polished (n = 21), outline-polished (n = 37). The median response determined the assignment to condition for each question. Because responses to these questions were correlated, the subjects were not evenly divided among the four groups. The mean overall productivity of these conditions is shown in Figure 4.

Insert Figure 4 about here

As in the experimental data, outlines had an impact but draft strategies did not. The no outline-rough condition differed significantly from both the outline-rough, $t(56) = 2.17$, $p < .05$, and the outline-polished conditions, $t(72) = 2.17$, $p < .05$. The no outline-polished condition also differed significantly from both the outline-rough, $t(40) = 2.11$, $p < .05$, and the

outline-polished conditions, $t(36) = 2.05$, $p < .05$. The minor differences between polished and rough conditions at a given level of outline condition were statistically negligible.

Conclusion

The recommendation to outline during prewriting is a sound one, judging from the present findings. Productivity of academic writers correlated positively with the frequency of using outlines. The results of the laboratory experiment with college students suggest that gains in productivity arise from the improved quality of documents composed with the benefit of an outline. The overall efficiency of writing does not seem to increase when the extra prewriting time needed to generate an outline is taken into account.

The recommendation to compose a rough rather than a polished draft finds no support in the present study. Trying to juggle planning, translating, and reviewing during all phases of composition theoretically should overload the writer, leading to poorer quality or efficiency. But, this result was not obtained in either the experiment or the survey. Academic writers who reported frequent use of outlines during prewriting also tended to use polished drafts. However, their use of a polished draft strategy had no consequences for their productivity.

The possibility that some writers may benefit from a purely rough draft approach under certain circumstances is not ruled out by the present results. The experimental writing task was limited--the subjects wrote one or two paged documents in a single session using a pen. If, for example, the subjects dictated a 30 page document over multiple writing sessions, one

may see a clear advantage for a rough draft strategy. Trying to polish a long document using dictation with no visual feedback may strain working memory and available cognitive capacity to the point that writing performance would suffer. Another limitation is that I gave to the participants facts to work with in composing their letters. The task required primarily organization and goal-setting during planning and relatively little generation of ideas. The benefits of a rough draft may be apparent only when the writer has no idea at all about what needs to be said in a document. Situations in which the ideas are generated as a consequence of the act of writing may be best suited to the rough draft strategy (Elbow, 1981, Horton, 1982). Finally, individuals who report suffering from writer's block may stand to gain the most from the rough draft strategy (Green & Wason, 1982). Those who experience intense anxiety when they attempt to write probably are most susceptible to cognitive overloads.

The survey concerned long documents--technical articles, reports, proposals, and books--that were undoubtedly composed and revised over numerous writing sessions. Dictation, word processors, and typewriters were reported as tools in addition to pens. The degree to which writers had to generate ideas on a first draft probably varied considerably, both across writers and within a given writer across various assignments. Also, the amount of anxiety experienced while trying to write probably varied enormously in the large sample of respondents. Thus, the generality of the conclusion of no difference between rough

versus polished drafts is greatly enhanced by the survey results. Even so, it may be worth trying to isolate in future laboratory or field research the cases where advantages for rough drafts are observable.

The best direction for future research, however, is to explain specifically why outlines improve the quality of writing and overall productivity. The benefits of outlines may derive from the increased time spent translating during composition. The subjects who outlined in the business letter task reported spending markedly more time translating than they did planning and reviewing during composition. This was less true for the subjects in the no outline conditions. It would be interesting to know if more cognitive effort is focused on translating, as well as more time, when writers outline. Another important question is whether using an outline decreases the overall degree of effort needed, summing the effort spent on planning, translating, and reviewing.

As noted in the introduction, another explanation based on processing differences is that outlines relieve the strain on working memory by providing an external representation of the planned text. This could help in two ways. Scardamalia, Bereiter, and Goelman (1982) noted that when a writer shifts from attending to a low level of text representation (e.g., spelling) to a high level (e.g., the overall plan for a text segment), he or she is likely to face the question, "Now, where was I?" Finding where to pick up again may be easier if the writer does not have to rely solely on working memory for storage of the plan; the writer may benefit from finding his or her place in the

external representation. The second way is more obvious. Representing the plan externally in an outline conceivably frees space in working memory for other useful information. To illustrate, translating ideas into text may proceed best when the writer is guided by an outline because he or she can dedicate working memory to storing alternative ways of phrasing a proposition, for example.

A nonprocessing, knowledge based explanation is also plausible. The knowledge structure or schema of ideas that the writer wishes to communicate may be sufficiently clear and well developed only when the writer outlines. The improvement in effectiveness of communication may stem solely from the detailed structure of the writer's knowledge rather than from characteristics of the writing process.

Besides the why question, another important issue for future research concerns when outlines help writers. Although the survey results indicate that the effect of outlines is robust, there may be writing tasks that fail to benefit from their use. For instance, if a writing assignment calls for a short, simple document, then outlines may be pointless. Also, if the writer already has developed and stored a detailed schema in long-term memory for representing ideas and their organization, then outlining may be unnecessary even for a long, complex document. Writers probably make judgments all of the time about whether to do an outline for a particular task. Research on when outlines make a difference could conceivably aid writers in making this decision.

Findings on why and when outlines help writers will be useful in developing a detailed process model of writing. Such a model must be able to account for the observed benefits of this top-down approach to composition. The problem-solving model for writing suggested by Hayes and Flower (1980) may be a good point of departure for this endeavor. Other informative results and theories stem from work on writing computer software (Adelson & Soloway, 1984; Jeffries, Turner, Polson, & Atwood, 1981). I would expect some convergence in understanding how people design computer programs and natural languages documents.

In summary, the contribution of the present study is both empirical and methodological. It offers the first clear evidence that outlines improve writing quality and that draft strategies are apparently a matter of personal preference with no consequences for performance. Also, it illustrates that serious questions about the generality of laboratory results on writing can be answered by converging evidence from surveys and perhaps other field methods.

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Footnote

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Table 1

Mean Scores on Measures of Writing Performance

Conditions	Measure					
	Number of Words	Letter Time (Minutes)	WPM (Letter)	WMP (Overall)	Words Added	Words Deleted
No Outline						
Rough	156.83	17.82	8.80	8.80	3.44	5.61
Polished	196.72	24.16	8.14	8.14	8.72	11.89
Outline						
Rough	316.22	27.18	11.63	8.82	5.89	17.72
Polished	316.00	29.00	10.89	8.43	4.61	21.00

Table 2

Mean Rating on Five Scales of Letter Quality

Conditions	Scales				
	Usage	Coherency	Development	Effectiveness	Mechanics
No Outline					
Rough	3.58	3.42	2.56	2.50	4.11
Polished	3.61	3.39	2.94	2.56	3.67
Outline					
Rough	4.17	4.06	3.69	3.50	4.22
Polished	3.97	3.58	3.56	3.22	4.08

Note: The mean ratings are averaged across judges (n=2) and subjects (n=18). Each scale ranged from 1 (Poor) to 7 (Excellent).

Table 3

Correlation Coefficients in Survey of Academic Writers

	Written Outline	Polished Draft	Overall Productivity
Written Outline	1.00	0.19*	0.27**
Polished Draft		1.00	-0.01
Overall Productivity			1.00

*$p < .05$ $n = 116$

**$p < .01$

Figure Captions

Figure 1. Estimated percent of letter time spent planning (P), translating (T), and reviewing (R) for rough and polished draft conditions.

Figure 2. Estimated percent of letter time spent planning (P), translating (T), and reviewing (R) for no outline and outline conditions.

Figure 3. Mean overall quality rating of the letter.

Figure 4. Mean reported productivity in faculty survey.

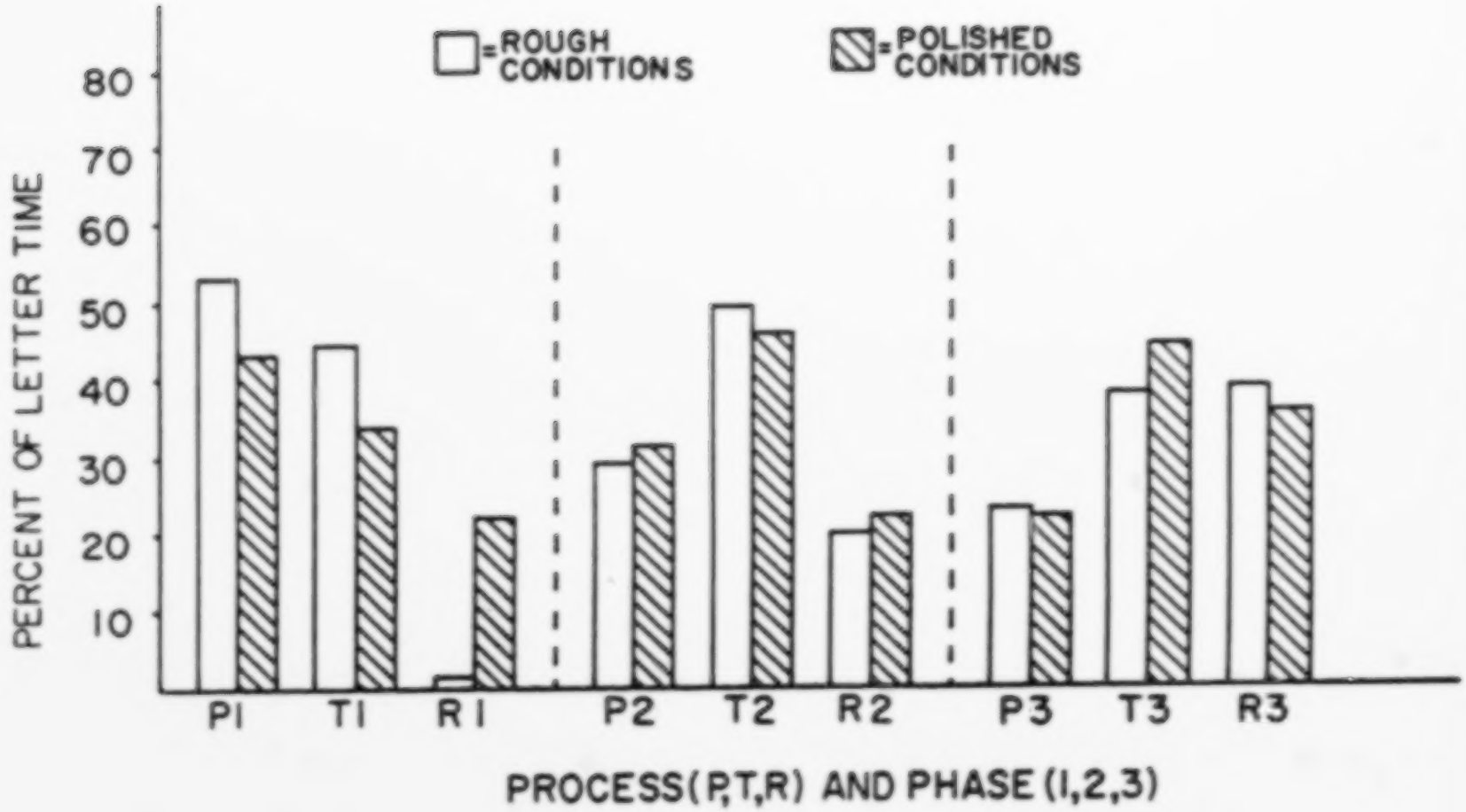
□=ROUGH CONDITIONS
▨=POLISHED CONDITIONS
PERCENT OF LETTER TIME
80
70
60
50
40
30
20
10
P1
T1
R1
P2
T2
R2
P3
T3
R3
PROCESS(P,T,R) AND PHASE (1,2,3)

Figure 1

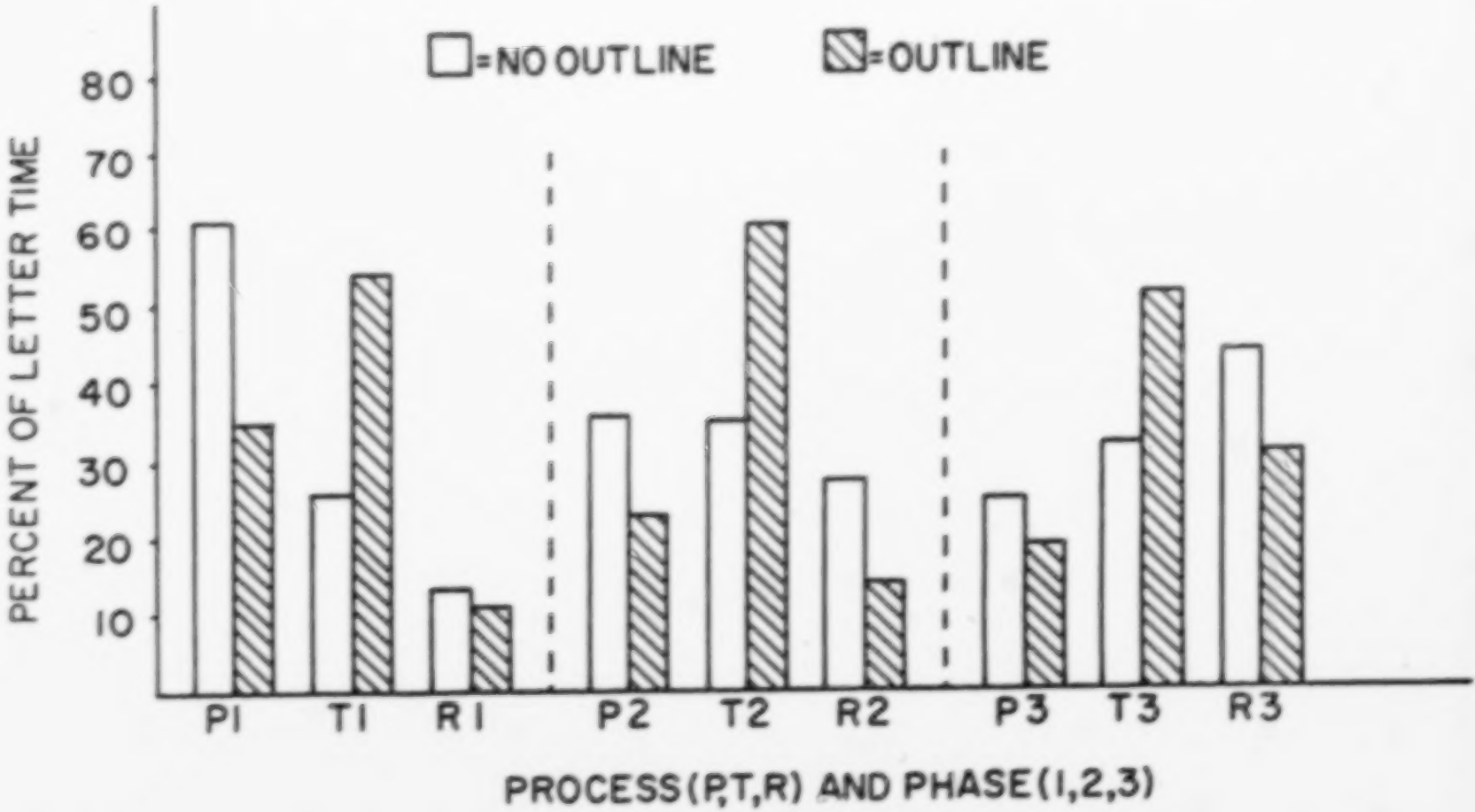
□=NO OUTLINE
▨=OUTLINE
PERCENT OF LETTER TIME
80
70
60
50
40
30
20
10
P1
T1
R1
P2
T2
R2
P3
T3
R3
PROCESS(P,T,R) AND PHASE(1,2,3)

Figure 2

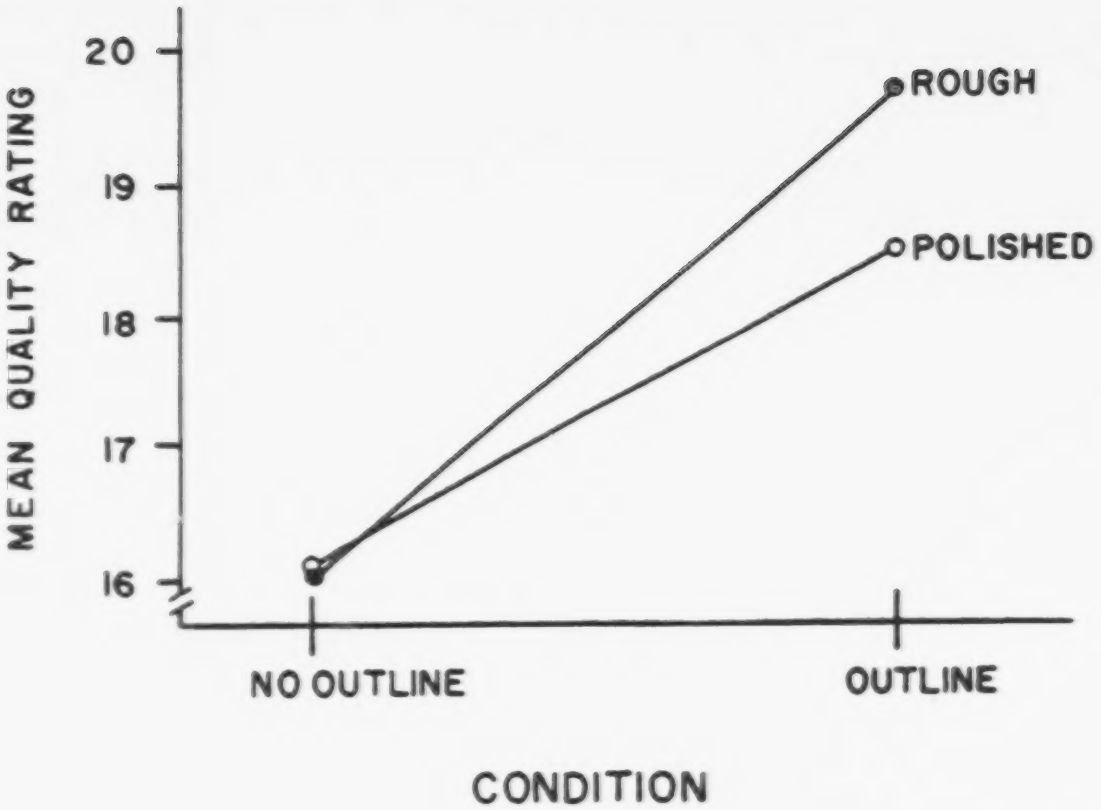
MEAN QUALITY RATING
20
19
18
17
16
ROUGH
POLISHED
NO OUTLINE
OUTLINE
CONDITION

Figure 3

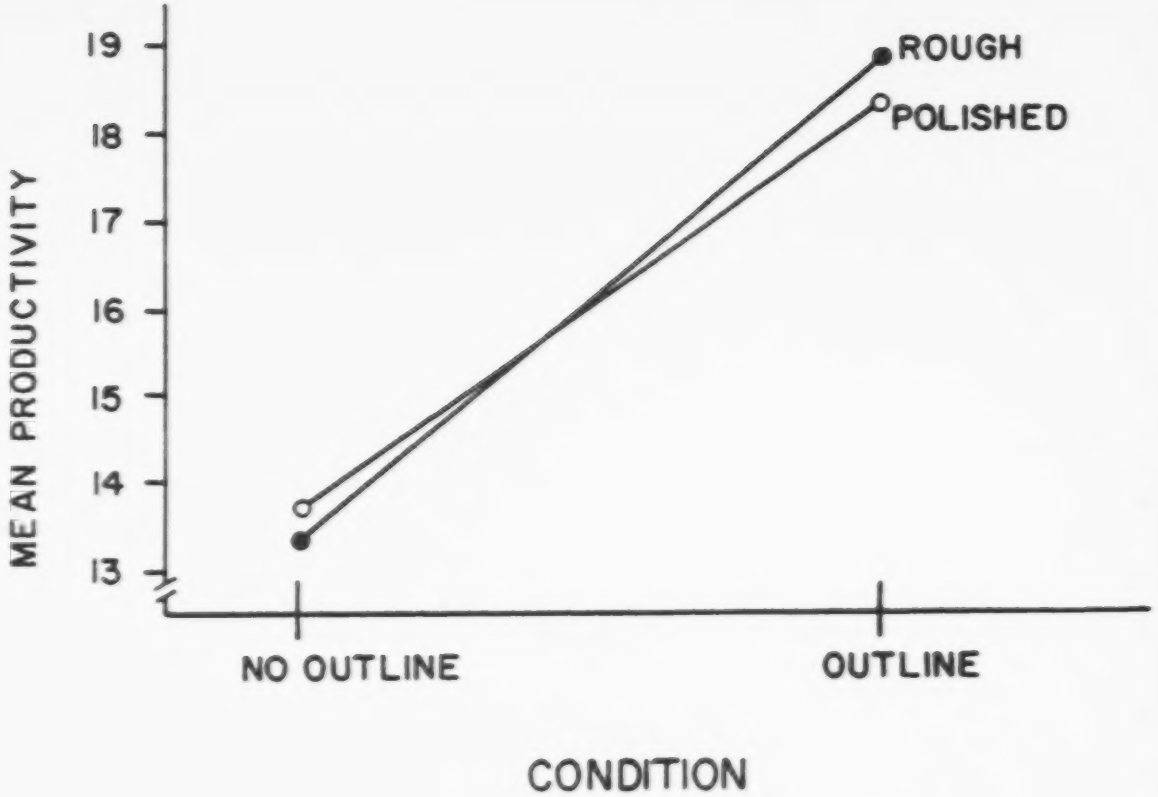
19
18
17
16
15
14
13
MEAN PRODUCTIVITY
ROUGH
POLISHED
NO OUTLINE
OUTLINE
CONDITION

Figure 4